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# SWIFTLET BIRD (*Aerodramus fuciphagus*) AFFINITY ANALYSIS IN JAVA AND KALIMANTAN BASED ON MORPHOMETRY

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**Abstract**

Swiftlet bird nest quality difference still become conflict the experts, particularly about spread pattern influence in Jawa and Kalimantan in quality nest. Research aimed to determine affinity inter swiftlet bird in Java and Kalimantan. Swiftlet bird affinity determination used by morphology scaling approach. Get similaritas value and phenogram that describe affinity inter sample used CLAD97 application. Result Research indicate that morphometry scaling and continued with phenogram obtained that all samples can be classified within one genus with similaritas value 0,56.

**Key word** : Swiftlet bird, Morphometry

## INTRODUCTION

Swiftlet an insectivorous bird species that became an important commodity in the food industry . Generate swiftlet nests can be processed into a number of types of food and is believed to cure several diseases ( Koon and Cranbrook , 2002) . Swiftlet bird nests built by birds' ( Aerodramus fuciphagus ) using saliva and serves to place the mating , laying eggs and caring for puppies to be able to fly . Nest construction takes 40-90 days depending on the breeding season ( breeding season) ( Medway , 1961; Nguyen , 1994) .

Traded swiftlet bird nest comes from two places, namely natural caves and swiftlet bird homes . Swiftlet bird nest there are white , black and red . Bird's nest from Kalimantan has a better quality than swiftlet bird nest from Java . Differences swiftlet bird nest from Kalimantan and Java can be seen from the color of swiftlet bird nest from Kalimantan whiter than the swiftlet bird nest of Java . Differences in the type and color of the swiftlet bird nest as yet unknown cause and is still being debated experts ( Lee et al . , 1996; Ingolf , 2004; Price et al . , 2004; Thomassen et al . , 2005; Massimo , 2005)

According to Lee et al . ( 1996) differences in the type and color of the nest is the result of the activity of birds ' reproductive behavior , so that the nest with different characteristics thought to be produced by individual birds' different , and according to Price et al . (2004 ) echolocation can be used to distinguish the types of existing swiftlet bird . The results obtained by different research Massimo (2005 ) which states that the color of the nest due to the inclusion of chemical elements during the process of forming a nest . Based on these studies , it can be concluded that the difference in the condition of swiftlet bird nest can be caused by intrinsic and extrinsic factors .

One of the intrinsic factors that may influence the type and color of the nest is a sub - species of swiftlet . Sub - species of swiftlet bird can be detected through analysis of phenotypically kinship reinforced by molecular analysis . Phenotypic analysis was done by using morphometry , so known morphological characters of the bird that was tested , whereas

molecular analysis requires a molecular marker . Molecular markers are widely used in the analysis of kinship in birds is mitochondrial genes such as CYT - b gene ( Johnson and Clayton , 2000).

Kinship between birds' in Java and Kalimantan are still unknown , so it is necessary to do research on birds' kinship analysis ( *Aerodramus fuciphagus* ) in Java and Kalimantan formulation of the problem in this study is whether the birds' ( *Aerodramus fuciphagus* ) in Java and Kalimantan are still related ? This study aims to determine the genetic relationship of swiftlet bird found in Java and Kalimantan

## RESEARCH METHOD

### 1 . Bird Sampling

Bird that will be analyzed kinship derived from swiftlet house located on the island of Java and Kalimantan . Samples of Java comes from the region of Gresik , Semarang , and Bandung , whereas samples obtained from regions of Kalimantan Banjarmasin , Pontianak , Tarakan , and Bontang . Distribution point where sampling is determined by the position of the largest manufacturers of swiftlet bird nest . The samples were used from each region is two birds .

### 2 . Phenotypic Analysis by Morphometry

Phenotypic analysis was conducted to determine relatedness between birds' based on morphological characters possessed . Morphological Characterization swiftlet done through morphometry techniques , ie by measuring the characters that have been determined using calipers . These characters include: total body length , body circumference , high head , head length , head width , half height , half width , length of upper body , lower body length , the distance eye - dorsal head , base of the beak - eye distance , diameter eyes , nares - end distance beak , nares - dorsal half distance , long suppressed wing , wing length is not pressed , the length of the edge of the primary wing feathers , the long primary feathers , the number of secondary wing feathers , secondary feathers long , long toes 1 , 2 long toes , long toes 3 , 4 long toes , long metatarsus Tarso , fibrotarsus long , long claws 1 , 2 claws long , long claws 3 , and 4 long claws . morphometry results were then analyzed with the application in order to obtain fenogram CLAD97 and value of similarity between samples .

## RESULT AND DISCUSSION

### 1 . Characterization of phenotypic

Using the 30 (thirty) on the distinguishing characteristics of each sample in bervareatif get results as in Table 1 .

**Table 1.** Results Sample Morphometry Swiftlet Bird

| No. | Sampel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | BNT 1 | 100.5 | 21 | 13.3 | 27.2 | 18.4 | 1.4 | 2.2 | 46 | 33 | 2.8 | 5.6 | 4.9 | 2.7 | 0 | 113.8 | 111 | 96 | 10 | 7 | 25.7 | 3 | 4.1 | 4.7 | 5 | 10.9 | 29.5 | 2.2 | 3.4 | 3.4 | 3.2 |
| **2** | TRK 2 | 101.8 | 22 | 19.5 | 22 | 16.5 | 20 | 2 | 40 | 37 | 3.5 | 6 | 5.8 | 2.1 | 0 | 112.7 | 107.5 | 90 | 10 | 7 | 27 | 2.1 | 4.4 | 4.8 | 5.1 | 11 | 12 | 1.8 | 4.2 | 3.6 | 3.7 |
| **3** | BDG 1 | 108.5 | 24 | 16 | 26 | 16.8 | 2 | 20 | 68 | 40 | 2 | 6.5 | 5 | 2 | 0 | 108.8 | 103 | 86 | 10 | 7 | 22 | 3 | 5.5 | 5.9 | 5.2 | 9.5 | 16.2 | 2.1 | 3.5 | 3 | 3 |
| **4** | PNK 1 | 104.1 | 23 | 16.5 | 29 | 19.2 | 1.9 | 2.3 | 61 | 41 | 2 | 6.4 | 6.5 | 2.7 | 0 | 109.5 | 104.4 | 97.7 | 10 | 7 | 23.6 | 4.5 | 5 | 4.7 | 5 | 10 | 18.8 | 2.4 | 3 | 3 | 4 |
| **5** | GRK 2 | 105.8 | 24 | 18 | 27 | 19.5 | 2 | 3 | 77 | 43 | 2 | 6.5 | 6 | 3 | 0 | 112.3 | 108.8 | 95.8 | 10 | 7 | 22 | 3 | 5.5 | 6.8 | 5 | 8 | 16 | 2 | 3 | 4.2 | 3 |
| **6** | PNK 2 | 105 | 23 | 19.9 | 29 | 19 | 2 | 2 | 84 | 40 | 2 | 6.5 | 6.8 | 2.8 | 0 | 117 | 112.1 | 97 | 10 | 7 | 27 | 3 | 5.6 | 4 | 3 | 9.9 | 16 | 2.8 | 5 | 3.8 | 3 |
| **7** | TRK 1 | 97.5 | 21 | 19 | 27.5 | 21 | 2 | 4 | 79 | 35 | 2 | 6.2 | 5.6 | 2.9 | 0 | 115.3 | 109.6 | 97 | 10 | 7 | 23 | 3.9 | 4.5 | 5 | 3.8 | 11 | 17 | 3 | 4 | 4 | 3 |
| **8** | BDG 2 | 105.5 | 24 | 19.6 | 28.2 | 21 | 2 | 3.5 | 77 | 32 | 2 | 6.8 | 5.3 | 2.8 | 0 | 17 | 109.7 | 95 | 10 | 7 | 24.6 | 3.5 | 4.9 | 6 | 5.5 | 13 | 21.5 | 3 | 3.2 | 4.8 | 4 |
| **9** | BNT 2 | 98 | 22 | 17.5 | 25.9 | 16.7 | 2.2 | 1.5 | 82 | 38 | 1.5 | 7.2 | 5.2 | 2 | 0 | 112 | 107 | 92.7 | 10 | 6 | 29.1 | 2 | 3.2 | 5.1 | 4.8 | 9 | 13 | 1.5 | 2 | 2 | 3.1 |
| **10** | BJM 2 | 110 | 26 | 19.9 | 28.5 | 20 | 1.5 | 2.1 | 75 | 32 | 1.5 | 6.2 | 5.9 | 2 | 0 | 116 | 110 | 100.1 | 10 | 7 | 29 | 2.5 | 5.3 | 6 | 4.5 | 11 | 14 | 2 | 3.5 | 4 | 4 |
| **11** | SMG 1 | 103.3 | 22 | 16.2 | 27.5 | 18 | 1.5 | 2.5 | 77 | 27 | 1.6 | 6.1 | 5.9 | 1.4 | 0 | 104.5 | 111 | 94.5 | 10 | 7 | 26.8 | 3 | 5.9 | 6.1 | 4.9 | 8.5 | 6.2 | 2.7 | 3.4 | 4 | 4 |
| **12** | SMG 2 | 105 | 24 | 7.6 | 26 | 17.8 | 1.8 | 2.7 | 78 | 35 | 2 | 6.8 | 6.4 | 5.9 | 0 | 1.9 | 105 | 110.2 | 10 | 6 | 25.4 | 2.7 | 4.5 | 6.4 | 4.65 | 10.7 | 16.2 | 2.1 | 3 | 4 | 4 |
| **13** | GRK 1 | 115.5 | 26 | 21.7 | 28 | 20.7 | 22 | 24 | 82 | 33 | 1.9 | 6.6 | 5.6 | 2.1 | 0 | 113 | 109.1 | 90.55 | 10 | 7 | 22.9 | 3.8 | 5.1 | 6.2 | 6.9 | 9.1 | 6.1 | 3.2 | 3 | 4 | 3.8 |
| **14** | BJM 1 | 98.3 | 22 | 22.2 | 29.1 | 19.95 | 2 | 2.3 | 78 | 30 | 17 | 5.6 | 5.25 | 1.7 | 0 | 112 | 108.1 | 88.5 | 10 | 7 | 22.2 | 2.1 | 4.1 | 6.2 | 5 | 11.7 | 16.8 | 2 | 4 | 3.5 | 3 |

**Description:**

1 The total length of the body
2 circumference length of the body
3 heads high
4 length of head
5 head width
6 tall
7 half width
8 body length above
9 body length below
10 distance of eye-head
11 eye distance of the base of the half-length claws
13 nares-end distance of half
14 nares-distance dorsal half
15 long wings pressed
16 length of the wing is not pressed
17 long primary wing feathers the edges
18 primary wing feather length
19, the number of secondary wing feathers
20 secondary wing feathers
21 long toes 1
22 long toes 2
23 long toes 3
24 long toes part 4
25 length Tarso metatarsus
26 length fibrotarsus
27 long claws 1
28 long dorsal claw 2
29 3 Eye diameter 12
30 long claws 4

Characterization result data processed by the application CLAD97 showed that all samples was included in similarity value of 0.55 get results as in Figure 1


**Figure 1 .** Fenogram 14 test samples

**2 . Discussion**

Phenotypic characterization through morphometric observations of a sample of swiftlet bird any area that is used as the test results give results with relatively low variation . The following characterization result data processed by the application CLAD97 showed that all

samples was included in a family with a similarity value of 0.55 . The results of phenotypic characterization has been done only to determine the classification of the test sample at the family level . That is because the morphometry of the test sample is less varied .

Bird that comes from Kalimantan has a relatively larger size compared with the bird that comes from Java . This can affect birds' morphological differences coming from two places yangberbeda . Morphological differences may affect kinship swiftlet swiftlet between .

Morphological differences ( phenotypes ) swiftlet Kalimantan and Java can be caused by genotype and environmental factors , so that the birds' Kalimantan kinship studies can proceed with phylogenetic approach . Phylogenetic approach is an approach based on genomic methods . The characters used in this approach is a molecular marker sequences from housekeeping genes or genes predominantly conserved but has a small part of a very diverse ( hyper - variability ) . The characters are processed using genomic analysis applications kladistik with ClustalX and Phylip , so that the sample obtained phylogeny tree ( OECD , 1997) . Phylogeny tree will give you an idea of the kinship between the sample and its association with ancestor , taking into account the factors of evolution .

## CONCLUSION AND SUGGESTION

Swiftlet birds of Java ( Gresik , Semarang , and Bandung ) and Kalimantan ( Pontianak , Tarakan , Bontang , and Banjarmasin ) is still included in the same family based morphometry results of phenotypic characters . Based on these results, it still can not be determined kinship between birds' of Java and Kalimantan to the level of sub - species .

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